

## **SWIM FIN**

### **Field Of The Invention**

The present invention relates to the field of swim fins and associated methods of swimming.

### **Summary Of The Invention**

With the foregoing in mind, the present invention advantageously provides a swim fin comprising a foot portion and a web portion. The foot portion has a shoe for receiving the foot of a wearer and has a plurality of openings in a toe end of the shoe. The web portion extends from the foot portion and has a first end, a second end, a plurality of support members having web material associated therewith, and a plurality of bosses positioned adjacent the first end and detachably connected with the plurality of openings.

### **Brief Description Of The Drawings**

Some of the features of the present swim fin been stated, others will become apparent as the description proceeds when taken in conjunction with the accompanying drawings, presented for solely for exemplary purposes and not with intent to limit the invention thereto, and in which:

FIG. 1 is a side elevation view of the swim fin in use according to an embodiment of the present invention;

FIG. 2 is a top perspective exploded view of the swim fin of FIG. 1;

FIG. 3 shows a partial cutaway view of bosses in the web portion of the present swim fin engaging slots of the foot portion;

FIG. 4 is a side elevation view showing a flexing action of the present swim fin in a downward power stroke;

FIG. 5 is a front elevation view illustrating the present swim fin during a power stroke by a swimmer and the flexing action which expands the web portion of the fin;

FIG. 5A is a partial cutaway view showing the boss-slot connection as the boss moves upwardly in an angled slot in the swim fin of FIG. 5;

FIG. 6 is a side elevation view showing a flexing action of the present swim fin in an upward return stroke;

FIG. 7 is a front elevation view illustrating the present swim fin during a return stroke by a swimmer and the flexing action which contracts the web portion of the fin;

FIG. 7A is a partial cutaway view showing the boss-slot connection as the boss moves downwardly in an angled slot in the swim fin of FIG. 7;

FIG. 8 shows a swim fin according to FIG. 1, wherein a return stroke tends to close the web portion of the fin;

FIG. 9 illustrates the swim fin of FIG. 8, wherein a power stroke tends to spread open the web portion of the fin;

FIG. 10 is an embodiment of the swim fin of FIG. 1 wherein the toe end of the foot portion has a downwardly curved arch, which tends to allow further closing of the web portion during a return stroke;

FIG. 11 shows the swim fin of FIG. 10 wherein the power tends to more fully spread open the web portion of the fin; and

FIG. 12 is a side elevation view of the present swim fin in use, wherein the toe end of the foot portion of the fin has an arch having a curvature oriented along a lengthwise extent of the fin.

#### **Detailed Description of the Preferred Embodiment**

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which various embodiments of the invention are shown. Unless otherwise defined, terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention pertains. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods and materials are described below. In

addition, materials, methods and examples given are illustrative in nature only and not intended to be limiting. Accordingly, this invention may be embodied in different forms and should not be construed as limited to the illustrated embodiments set forth herein. Rather, these illustrated embodiments are provided solely for exemplary purposes so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Other features and advantages of the invention will be apparent from the following detailed description, and from the claims.

FIGS. 1-11 illustrate embodiments of a swim fin **20** comprising a foot portion **22** and a web portion **24**. The foot portion **22** has a shoe **26** for receiving the foot of a wearer and a plurality of openings **28** in the toe end **30** of the foot portion. The web portion **24** of the swim fin **20** extends forwardly from the foot portion **22** and has a first end **32**, a second end **34**, a plurality of support members **36** having web material **38** associated therewith, and a plurality of bosses **40** positioned adjacent the first end. The bosses **40** connect the web portion **24** of the swim fin **20** to the foot portion **22** by connecting with the plurality of openings **28**. The connection whereby the bosses **40** are connected in the plurality of openings **28** may be detachable, so as to allow a user to disconnect the web portion **24** of the swim fin **20** from the foot portion **22**, if desired. The bosses **40** are preferably members which extend outwardly from a surface of the web portion **24** of the fin, the outward extent of the bosses being engageable with the openings **28** on the foot portion **22** of the fin. Additionally, the skilled will understand that the plurality of bosses **40** may alternatively be positioned on the foot portion **22** of the swim fin **20**, and the plurality of openings **28** may be positioned on the web portion **24**, the connection therebetween rendering substantially the same result. Moreover, while the plurality of bosses **40** is described as a preferred embodiment of the invention, the skilled artisan will recognize that any other mechanical connection by which foot portion **22** and web portion **24** may be

connected together with the swim fin providing the desired flexible motion is intended to be included within the scope of the invention.

It should be understood that the term "shoe" as used herein with reference to the foot portion **22** of the swim fin is intended to include any structural arrangement which permits a wearer to contact the swim fin with his or her foot and to secure the swim fin to the foot for use. Accordingly, for example, "shoe" may include a generally elongated chamber formed in the foot portion **22** of the swim fin and having an opening large enough to insert a foot therein. By way of further example, a "shoe" in the foot portion **22** of the fin **20** may be shaped similarly to a typical sandal, wherein the swim fin has a surface area having the general outline of a human foot, and having one or more straps to secure the foot thereto. In yet an additional example, the "shoe" may be a chamber of sufficient size to therein receive the forward portion of a user's foot, and having connected thereto a strap which may be secured around the heel part of the user's foot to secure the fin onto the foot. Those and other arrangements as understood by the skilled for securing the swim fin in contact with the foot are intended to be included within the meaning of the term "shoe" as employed herein and recited in the claims.

In one preferred embodiment of the swim fin **20**, as shown in FIGS. 2-3, the plurality of openings **28** comprises elongated openings positioned in a generally perpendicular orientation to an imaginary plane lying along a lower surface of the foot portion. As seen in FIG. 2, the plurality of openings **28** may also comprise an array of spaced apart slots positioned in generally perpendicular orientation to an imaginary plane lying along a lower surface of the foot portion, wherein at least first and last slots of the array are oriented at an angle to the imaginary plane. It should be understood, however, that the plurality of openings may include all slots oriented at an angle to the imaginary plane, or may include only some of the slots oriented at an angle, depending on the degree of flexing desired in the fin during use. The plurality of bosses **46** is preferably positioned slidably connected within the openings **28**, as is

depicted in FIGS. 3, 5 and 7A. That is, during use of the swim fin, the bosses 40 may move within the openings 28, which movement helps provide additional flexing in the web portion.

The web portion 24 of the swim fin 20 includes a plurality of support members 36 which are variously described in embodiments of the invention. The support members are best shown in FIGS. 2, 5, 7, and 8-11. In one embodiment of the fin, the plurality of support members 36 comprises at least one or more flexible support members. Web material 38 is associated with the support members 36 and may extend between individual support members of the plurality of support members, as illustrated in FIGS. 2, 5, 7, and 8-11. The associated web material 38 may also be above or below the support members 36 in such a way as to derive sufficient support therefrom. The embodiment of the swim fin 20 shown in FIG. 2 includes a first and a last support member positioned to define lateral peripheries of the web portion 24. The plurality of support members 36 may also comprise at least one elongated support member which extends along a lengthwise dimension from the first end 32 to the second end 34 of the web portion 24, and which is relatively flexible. The skilled will understand that the web material 38 is connected to the plurality of support members 36 in some fashion to derive support therefrom, and may even be integral with the support members, particularly if both are made of the same material and in one mold.

Additionally, as shown in FIG. 2, in one embodiment of the invention one or more of the support members in the web portion of the fin may be disposed with one or more hinges 42 or flexible joints along its lengthwise extent, the hinge allowing further flexibility in the support member. Preferably, such a hinge 42 or flexible joint is positioned to allow the support member 36 to be fully extended during the fin's power stroke, and to bend so as to increase flexing in the fin's web portion 24 during the return stroke. The hinge 42 or flexible joint may be mechanical or may be a portion of the support

member which possesses different flexibility characteristics than the rest of the support member, for example, by being made of a modified material.

In yet another embodiment of the swim fin **20**, the foot portion **22** has a toe extending forwardly from the shoe, the toe having a toe end **30** which is arch-shaped, as illustrated in FIGS. 10-12. In a preferred embodiment the toe arch extends across the width of the toe from one lateral periphery to the opposite lateral periphery of the shoe portion, as seen in FIGS. 10-11. The skilled will recognize that the toe end **30** being arched in this manner will result in some added curvature of the web portion **24** when connected thereto by engagement of the plurality of bosses **40** with the plurality of openings **28** on the toe end **30** of the foot portion **22**. The toe end **30** may curve downwardly or upwardly relative to the fin, according to preference. As seen in FIG. 12, in another embodiment of the present swim fin **20** the curvature of the toe end **30** arch may alternatively be oriented along a lengthwise axis of the fin so that the web portion is not generally parallel to an imaginary plane extending along a lower surface of the foot portion of the fin.

The added curvature of the web portion **24** provided by an arched toe end **30** will promote the flexing action of the web portion during use of the fin, aiding in simulating the closing and opening action of a frog's foot during swimming. For example, as shown in FIGS. 1 and 4-5A, during the downward power stroke of the fin (FIG. 4), the web portion **24** of the fin tends to spread out to provide increased power (FIG. 5). The spreading movement of the web portion is promoted by one or more bosses **40** being slidably connected with the angled slots **29** on the toe end **30** of the foot portion **22** of the fin (FIG. 5A). Conversely, during the upward return stroke of the swim fin, as shown in FIGS. 6-7A, the opposite action occurs. As the return stroke progresses (FIG. 6), one or more bosses **40** are urged downwardly along their connecting angled slots **29** (FIG. 7A), and the web portion **24** of the swim fin **20** tends to close (FIG. 7).

The web portion **24** will, therefore, have a tendency to flex along the toe end **30** aided by movement of the bosses **40** slidably connected with the openings **28** in the foot portion **22**. The toe end **30** may be relatively straight, or may have a degree of curvature. The degree of opening and closing of the spread of the web portion **24** will tend to be smaller in a fin having a relatively straight toe end **30**, as seen in FIGS. 8-9, and will tend to be more pronounced in a fin having a relatively curved toe end, as shown in FIGS. 10-11.

In this manner, the action of the web portion **24** of the swim fin **20** resembles that of the webbed foot of an amphibian, such as a frog, which tends to more fully spread during the power stroke in swimming, and tends to be less fully spread during the return stroke. Of course, in the present swim fin **20** the power stroke and return stroke will depend on the choice of whether the toe end curves downwardly or upwardly relative to the foot portion of the swim fin. It should be noted that, at the swimmer's preference, it is possible to wear a pair of swim fins in which one fin has its toe end generally curved upwardly and the other fin has its toe end generally curved downwardly, the web portions of the two fins being, therefore, generally opposite in their curvature. In this usage of the invention, the pattern of alternating power and return strokes would be different from the typical swimming pattern.

Method aspects of the described swim fins include a method of swimming comprising wearing at least one of the described swim fins while immersed in water. The method may additionally include wearing one swim fin wherein the toe end curves downwardly, and one swim fin wherein the toe end curves upwardly, to provide a different pattern of power and return strokes for the swimmer.

In the drawings and specification, there have been disclosed a typical preferred embodiment of the invention, and although specific terms are employed, the terms are used in a descriptive sense only and not for purposes of limitation. The invention has been described in considerable

detail with specific reference to these illustrated embodiments. It will be apparent, however, that various modifications and changes can be made within the spirit and scope of the invention as described in the foregoing specification and as defined in the appended claims.